



**NASA Quest**

<http://quest.arc.nasa.gov>



<http://quest.arc.nasa.gov/space/frontiers>

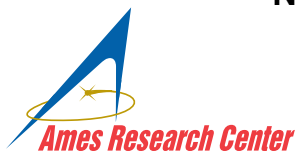
***Presents . . .***

# ***Female Frontiers***

***Susanne Ashby - Curriculum Specialist***

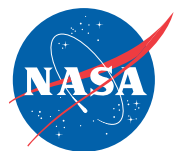
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Moffett Field, CA**

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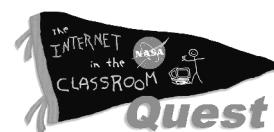
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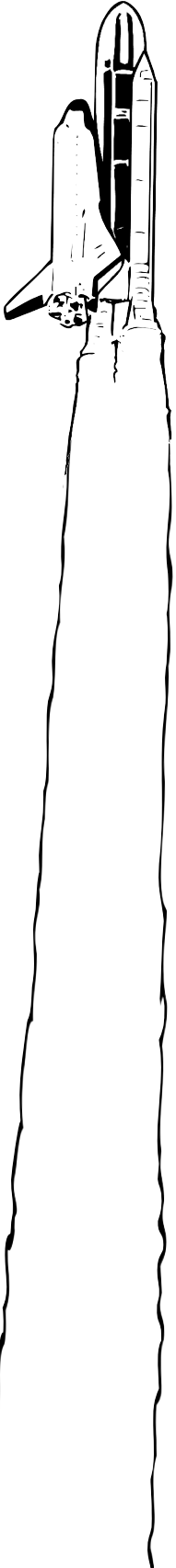
# ***Teacher's Desk***

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# Teacher Overview



Welcome to the Teacher's desk! Have a seat and get comfortable. You have lots of things to look at here. You will find many useful items on the desk. There are the typical organizational and informational features, such as the Daily Lesson Planner and a synopsis of how these materials correlate to the National Standards. The Standards referenced in the "Correlation to National Standards" chart can be found at the following URLs:

**National Reading / Language Arts Standards**

<http://www.ncte.org/standards/listtest.html>

**National Social Science Standards**

<http://peabody.vanderbilt.edu/depts/tandl/faculty/Myers/standards.html>

**National Mathematics Standards**

<http://www.nctm.org/standards2000/>

**National Science Standards**

<https://www.nap.edu/readingroom/books/nses/html/index.html>

Along with this overview, these will orient you quickly to the print materials that can be found at this site. The instructional materials located here are designed for use in a 4<sup>th</sup> through 8<sup>th</sup> grade classroom. They are cross-curricular in nature so that a teacher can engage students with the subject matter from language arts to mathematics. It also includes a mini-literature unit using the picture book Ruth Law Thrills a Nation by Don Brown.

The Web site is divided into the following 4 sections: Teacher's Desk, Space Shuttle Aeronautics, Woman's Work and Commander Collins. Each section contains cross-curricular activities that can be used in the classroom with your students. All the activities can be found in the "Student Handouts" sub-section on the Teacher's Desk in the form of Portable Document Format (PDF) files. These PDF files can be downloaded and printed out on your printer. These files consist of student activity sheets, student readings, student guide sheets and student worksheets that can be used to complement the information and activities found at this site.

The section “Space Shuttle Aeronautics” introduces students to the basic aeronautical science involved with the orbiter's flight. The students become familiar with the orbiter's structure, parts and control surfaces. The students perform a hands-on science exploration of the orbiter's control surfaces, and a mathematical activity involving glide slope is introduced. A typical flight scenario of a shuttle mission is displayed, and a mathematical activity dealing with payload weight is also offered.

“Woman's Work” is an entire section dedicated to a social science approach to women's roles in the American workplace. As mission STS-93 is a groundbreaking flight in that it is the first flight commanded by a female flight commander, it is fitting that focus is given to how women continue to re-define their roles in the workplace. This section includes a chart that displays the type of work women have performed during the last 100 years. This chart is followed by guidesheets to assist with group discussions, individual reflection and other interactions addressing the emerging and evolving roles of women in the American workforce.

The fourth section, “Commander Collins” focuses not only on this groundbreaking female flight commander of a space shuttle mission, but also involves students in the recognition of the women in their own families. Other activities deal with the importance of setting goals, and relate the steps that Commander Collins followed to become a shuttle commander. The students also get a glimpse of the kind of responsibilities a shuttle commander has on such a mission. In addition, students can connect in a personal way to this mission by familiarizing themselves with the personal kit that each astronaut carries with him/her during the mission. Students then react to this by creating their own personal preference kit. Students will also be able to engage in online chats and interviews with key personnel involved with this mission.

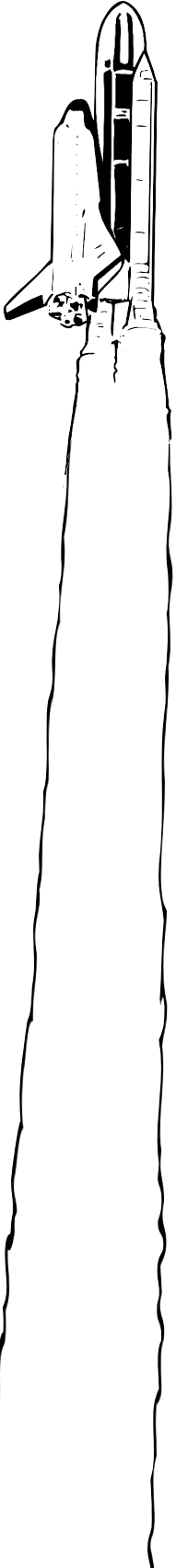
All in all, we know you'll find these materials useful as well as easy to implement in your classroom.



## *Correlation to the National Standards*

National Standards → ENGLISH / READING / LANGUAGE ARTS ↓ Web site section		SOCIAL SCIENCE	MATHEMATICS	SCIENCE
<b>TEACHER'S DESK</b> (mainly the literature unit)	Standard Numbers: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 11 - 12	Standard Numbers:  I. Culture  III. People, Places, Environments		see next page
<b>SPACE SHUTTLE AERONAUTICS</b>	Standard Numbers: 1 - 2 - 3 - 6 - 11 - 12	Standard Numbers:  VIII. Science, Technology and Society	Standard Numbers: 1) Math as problem solving 2) Math as communication 4) Mathematical Connections 9) Algebra 12) Geometry 13) Measurement	see next page
<b>WOMAN'S WORK</b>	Standard Numbers: 1 - 2 - 6 - 7 - 8 - 11 - 12	Standard Numbers:  I. Culture II. Time, Continuity and Change IV. Individual Development and Identity V. Individuals, Groups and Institutions VI. Power, Authority, Governance		see next page
<b>COMMANDER COLLINS</b>	Standard Numbers: 4 - 5 - 6 - 7 - 8 - 11 - 12	Standard Numbers: IV. Individual Development and Identity V. Individuals, Groups and Institutions X. Civic Ideas and Practices	Standard Numbers:  13) Measurement	see next page

## ***Science Standards***



SECTION	UNIFYING CONCEPTS AND PROCESSES	PHYSICAL SCIENCE STANDARDS	SCIENCE PROCESSES	OTHER SCIENCE STANDARDS
TEACHER'S DESK				Science in Personal and Social Perspectives
SPACE SHUTTLE AERONAUTICS	Evidence, models and explanation  Form and Function  Systems, order and organization	Motions and forces	Asking questions  Investigating  Observing  Collecting data  Predicting  Organizing data  Interpreting data  Communicating scientific arguments  Making models  Controlling variables	Science and Technology  Science as Inquiry
WOMEN'S WORK				Science in Personal and Social Perspectives  Science and Technology
COMMANDER COLLINS				Science and Technology

# Daily Lesson Planner

These instructional materials are designed for use in the 4<sup>th</sup> through 8<sup>th</sup> grade classroom. They are cross-curricular so that a self-contained classroom teacher can immerse their students in the Female Frontiers shuttle mission experience. The teacher is encouraged to preview the Web site “Female Frontiers” daily during the mission as Web chat opportunities and new online activities will be made available.

This Suggested Daily Lesson Planner is designed to meet the needs of the busy educator. If a teacher would make full use of all the instructional materials contained on this Web site, one would have a solid two-week, cross-curricular experience. The lesson planner is divided into 10 days with each day divided into the core subject areas (Language Arts, Mathematics, Science, Social Studies). Feel free to substitute or re-arrange the order for optimal classroom benefit.

## Day 1

### Language Arts

- Choose 2 of the “Into” activities from the literature unit “Thrilling a Nation”.

### Mathematics

- Carry That Weight Session 1

### Science

- Have students visit the **Female Frontiers** Web site at <http://quest.arc.nasa.gov/space/frontiers> for an introductory scavenger hunt. Place the students in pairs and give them each a “Web Site Scavenger Hunt” activity sheet of the items to find on the Web site. The first two questions are answered off the Web site’s opening page. After answering the first two questions, next direct the students to click on “Instructional Materials” and then to “Shuttle Aeronautics”. From here the students can survey the following sub-sections:
  - Space Shuttle Fact Sheet
  - The Space Shuttle Parts Vocabulary List
  - Reading: “The Shuttle is a Lifting Body”
  - The Shuttle at Work

Remind the students that they are not to engage in the activities or thoroughly read each sub-section, but to simply survey this part of the Web site and bring back specific information on their “Science Scavenger Hunt” activity sheet.



### **Social Studies\***

- Have the students access the “Woman’s Work” chart from the Web site (at <http://quest.arc.nasa.gov/space/frontiers/activities/womanswork/chart.html>)
  - Point out the organizational features of the chart as well as what kind of information is contained in each category. Give the students time to survey the chart before leading them in some Questions and Answers about the information as well as the implications for American society during each decade.
- \* Check the “Profiles of Frontierswomen” sub-section of the Web site for dates and times of interactive chats and Web casts to enliven your social studies’ time throughout the two week period.

### **Day 2**

#### **Language Arts**

- Read aloud pages 1 – 8 from the book Ruth Law Thrills a Nation. Ask the comprehension questions (#1 - #17) as the story is read or as a comprehension check at the end of the reading.
- Review the vocabulary (#1 - #13) as the story is read.
- Engage the students in some vocabulary work culminating in the Crossword Puzzle #1

#### **Mathematics**

- Carry That Weight Session #2

#### **Science**

- Using the Web site, have students examine the labeled diagram of the Space Shuttle and discuss the parts and their function.
- If possible view a videotape that details the space shuttle, its parts and their functions. (Note: NASA has available many videotapes through NASA CORE, 216-774-1051).
- Then use the activity sheet “Label the Parts of the Space Shuttle” for follow-up.

#### **Social Studies**

- Divide the class into small groups and provide access to the “Woman’s Work” chart (on computer or hard copy).
- Distribute the “Group Discussion Activity” and allow time for each group to discuss and answer questions.
- Have each group share their responses.
- Then distribute “Re-define the Future of ‘Woman’s Work Group Prediction” activity sheet and have each group record their predictions.
- Conclude this activity by having each group give two predictions for each category.
- Then post the “Expert’s Key” (overhead transparency) to compare the students’ predictions to what the futurist experts say.



### Day 3

#### **Language Arts**

- Read aloud pages 9 – 18 from the book Ruth Law Thrills a Nation. Ask the comprehension questions (#18 - #24) as the story is read or as a comprehension check at the end of the reading.
- Review the vocabulary (#14 - #26) as the story is read.
- Engage the students in some vocabulary work culminating in the Crossword Puzzle #2

#### **Mathematics**

- Carry That Weight Session #3

#### **Science**

- Have students use their vocabulary list of “The Parts of the Space Shuttle” and complete the “Space Shuttle Crossword” (from the Web site <http://quest.arc.nasa.gov/space/frontiers/activities/aeronautics/vocabulary.html> **or** in hard copy).
- Have students complete the “Space Shuttle Dot-to-Dot” and color.

#### **Social Studies**

- Group the students in pairs and give each pair a timeline search “Name the Year”. Have them access the “Female Aviation Firsts” timeline found on the Web site at <http://quest.arc.nasa.gov/space/frontiers/activities/womanswork/firststimeline/firsts.html> **or** a hard copy, and perform a timeline search.
- Review the answers upon completion, or collect and assess later.
- Assign for an at-home extension activity the “Female Family Member Lifeline Activity” due Day 5.

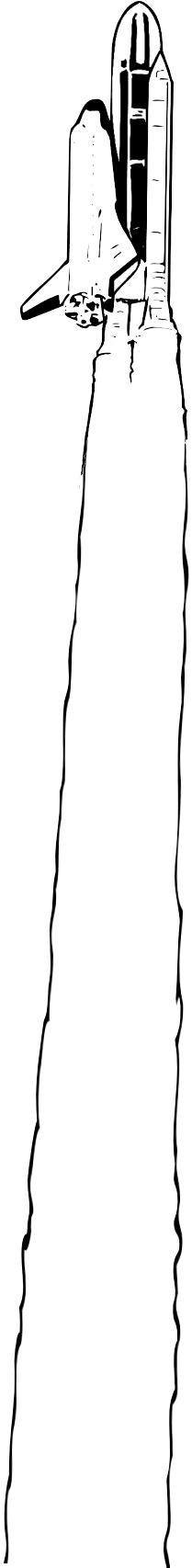
### Day 4

#### **Language Arts**

- Read aloud pages 19 – 29 from the book Ruth Law Thrills a Nation. Ask the comprehension questions (#25 - #31) as the story is read or as a comprehension check at the end of the reading.
- Review the vocabulary words (#27 - #31) as the story is read.
- Have the students work “Crossword Puzzle #3”.

#### **Mathematics**

- Glide Slope Activity Session #1



## Science

- Read and discuss with the students the “Student Reading: Aeronautics of the Space Shuttle”

## Social Studies

- Group the students in pairs and give each pair a timeline search “Name the Woman”. Have them access the “Female Aviation Firsts” timeline found on the Web site at <http://quest.arc.nasa.gov/space/frontiers/activities/womanswork/firststimeline/firsts.html> or a hard copy, and perform a timeline search.
- Review the answers upon completion, or collect and assess later.
- Remind the students that the at-home extension activity the “Female Family Member Lifeline Activity” is due Day 5.

## Day 5

### Language Arts

- Re-read the entire story Ruth Law Thrills a Nation.
- Have students in small groups, pairs or individually work the “Plotline Activity”.

### Mathematics

- Glide Slope Activity Session #2

## Science

- Review with the students the main ideas from the “Student Reading: Aeronautics of the Space Shuttle”
- Distribute the comprehension worksheet “Student Worksheet: Aeronautics of the Space Shuttle” and have them complete this.

## Social Studies

- Have students use their information from the “Female Family Member Lifeline Activity” to help them create their own individual timelines about a female family member.

## Day 6

### Language Arts

- Have students engage in the “Through” activity “Historical Aviation Commemoration”. (Allow 2 days work Day 6 & 7)

### Mathematics

- Glide Slope Activity Session #3.



## Science

- Have students access other Web sites that depict the phases of a space shuttle mission or to review the Female Frontiers Web site segment <http://quest.arc.nasa.gov/lrc/sto/vms/vms-v.ram> that features an interview that familiarizes the learner with the flight path of a typical mission.
- Have the students complete the “Phases of a Space Shuttle Mission” activity sequence sheet.

## Social Studies

- Have students access the sub-section “Commander Collins Bio-line” from the “Commander Collins” section of the **Female Frontiers** Web site. Key in during your discussion on Commander Collins’ early goal setting (1978). Then move on to the sub-sections “Steps to Commander” and “Commander’s Duties”.
- Split the class into small groups and distribute the activity sheets for “Be a Goal Setter Group Activity”. Have students collaborate, then post and discuss their steps.
- Distribute “I’m a Weekly Goal Setter”. Have the students complete this and then give an opportunity for some to share.
- Collect these or entrust students to keep their own copies, so that they can refer to their steps daily and stay on track. The teacher will review these with the students on Day 8.

## Day 7

### Language Arts

- Have the students complete the “Through” activity “Historical Aviation Commemoration”.

### Mathematics

- Glide Slope Activity Session #4

### Science

- Everything’s Under Control Session #1

### Social Studies

- Distribute the student reading “Personal Preference Kit”. Read and discuss the reading.
- Distribute the activity sheet for “Student Personal Preference Kit” and have students complete this and give thought to what objects they could bring from home, what they could draw a picture of or clip from a magazine at school or make a facsimile of during the next school day.
- Remind students to bring a shoebox from home for tomorrow’s activity.



## Day 8

### **Language Arts**

- Have the students complete the “Beyond” activity “Comparing Aircraft”. Use the overhead transparency of “That Daring Woman in Her Flying Machine” with its specifications for a detailed transparency.

### **Mathematics**

- Glide Slope Activity Session #5

### **Science**

- Everything’s Under Control Session #2

### **Social Studies**

- Re-Distribute the student activity sheet “I’m a Weekly Goal Setter” and have students individually evaluate their progress and return they activity sheets to the teacher for final check on Day 10.
- Allow time in class for the students to assemble their “Student Personal Preference Kits”.

## Day 9

### **Language Arts**

- Have the students in small groups engage in the “Beyond” activity “Commander Collins Thrills a Nation”. (Allow 2 days for this activity Day 9 & 10)

### **Mathematics**

- Glide Slope Activity Session #6

### **Science**

- Everything’s Under Control Session #3

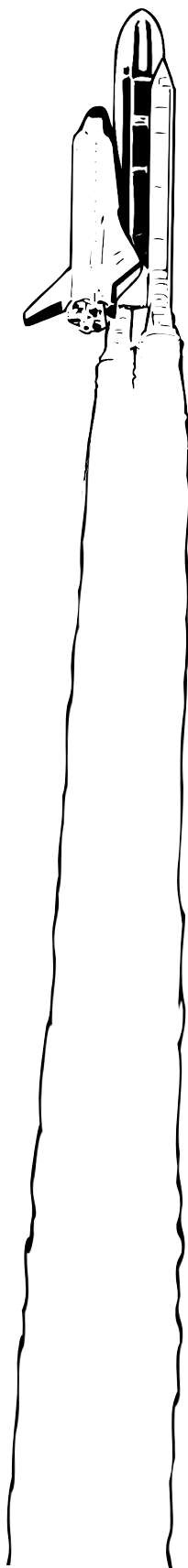
### **Social Studies**

- In small groups, partners or individually have students create a timeline following the “Woman’s Work Timeline” activity sheet.

## Day 10

### **Language Arts**

- Have the students in small groups complete the “Beyond” activity “Commander Collins Thrills a Nation”.



### **Mathematics**

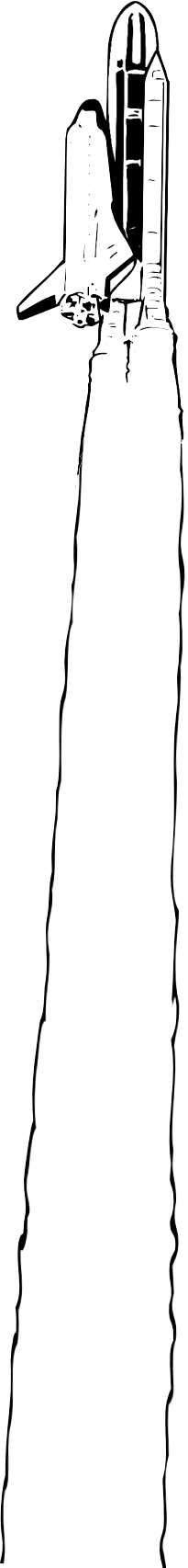
- Glide Slope Activity Session #7

### **Science**

- Teacher's choice

### **Social Studies**

- In small groups, partners or individually have students complete their timelines following the "Woman's Work Timeline" activity sheet.
- Have students turn in their "I'm a Weekly Goal Setter" activity sheet and discuss with them how they fared on this assignment.



# Resources

## Student Book List

### Ruth Law Thrills a Nation

Don Brown, 1993

ISBN: 0-395-73517-3 (paperback)

ISBN: 0-395-6404-7 (hardcover)

### Sky Pioneer

Corinne Szabo, 1997

ISBN: 0-7922-3737-4

### Jacqueline Cochran: America's Fearless Aviator

Nina McGuire & Sandra Wallus Sammons, 1997

ISBN: 0-9631241-6-1

### To Space and Back

Sally Ride with Susan Okie, 1986

ISBN: 0-688-09112-1

### The Dream is Alive: A Flight of Discovery Aboard the Space Shuttle

Barbara Embury & Tom D. Crouch, 1990

ISBN: 0-060-21813-4

### The First Unrefueled Flight Around the World

Richard L. Taylor, 1994

ISBN: 0-531-20176-7

### Lost Star: The Story of Amelia Earhart

Patricia Lauber, 1988

ISBN: 0-590-41159-4

### At the Controls - Women in Aviation

Carole Briggs

Learner Publications

ISBN: 0-822-51593-8

### Brave Bessie: Flying Free

Lillian M. Fisher

Hendrick-Long Publishing Company

ISBN: 0-937-46094-X

## ***Student Book List (continued)***

Up in the Air: The Story of Bessie Coleman

Philip S. Hart

Carolrhoda Books

ISBN: 0-876-14949-2

Women in Space: Reaching the Last Frontier

Carole S. Briggs

Lerner Publications

ISBN: 0-822-51581-4

## ***Teacher Book List***

The Space Shuttle Operator's Manual

Kerry Mark Joels & Gregory P. Kennedy, 1988

ISBN: 0-345-34181-3

Integrating Aerospace Science into the Curriculum: K – 12

Robert D. Ray & Joan Klingel Ray, 1992

ISBN: 0-87287-924-0

Amelia Earhart's Daughters

Leslie Haynsworth & David Toomey, 1998

ISBN: 0-688-15233-3

Timelines of American Women's History

Sue Heinemann, 1996

ISBN: 0-399-51986-6

Ladybirds

Henry M. Holden, 1991

ISBN: 0-7607-0364-7

Women of the Air

Judy Lomax, 1987

ISBN: 0-396-08980-1



## Web Sites

**<http://quest.arc.nasa.gov/space/frontiers>**

This NASA Quest site features the first space shuttle mission commanded by a female, Eileen Collins. Great activities for teachers and students.

**<http://www.gulfstreamair.com/women.htm>**

This site features a brief narrative that highlights some female aviation feats and events.

**<http://www.astr.ua.edu/4000ws/4000ws.html>**

Four thousand years of women in science has entry after entry of great biographies featuring female scientists, but also some female aviators.

**[http://earlyamericanhom.com/AviationHistory/articles/1999/01992\\_text.htm](http://earlyamericanhom.com/AviationHistory/articles/1999/01992_text.htm)**

A great article about Nancy Harkness Love and her work with the organizations of the WAFS and WASP.

**<http://www.women-in-aviation.com/>**

A fabulous Web site with great links and good educator information, book lists, etc.

**<http://www.wiai.org/>**

The International Women in Aviation Web site has the intent to encourage women to seek opportunities available to them in aviation. It includes a great little section that chronicles women who made aviation history.

**<http://ninety-nines.org/>**

This Web site features the organizational information for the International Organization of Women Pilots, "The Ninety-Nines". It includes 2 fabulous sections about past aviators and the female pilots making history today.

**<http://www.legacy98.org/timeline.html>**

A great timeline of the Women's Rights Movement from 1848 – 1998. Excellent resource for middle and high school students.

**<http://www.gale.com/gale/cwh/cwhtime.html>**

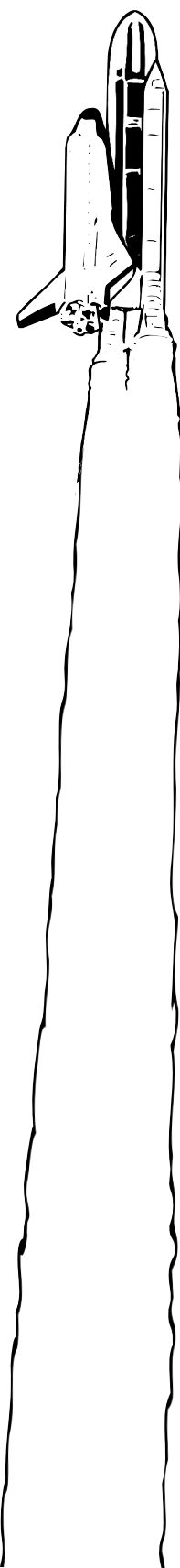
Includes female biographies and women's history timeline.

**<http://www.iwasm.org>**

The International Women's Air and Space Museum has a great site that features the women in aviation as well as their aircraft.

**<http://venus.twu.edu/www/twu/library/wasp.html>**

The Women Airforce Service Pilots Collection comes out of Texas Women's University's collection of personal papers, official records and a historical overview of the WASP.



## ***Web Sites (Continued)***

**[http://www.ionet.net/~jellenc/ae\\_intro.html](http://www.ionet.net/~jellenc/ae_intro.html)**

This is an expertly written, illustrated and presented tribute to the female aviator Amelia Earhart. The text about her life is easy to read and covers her life. It also includes links to other similar sites.

**<http://edweb.sdsu.edu/SDHS/collections/curtiss/curtiss.htm>**

This San Diego-based Web site is a great collection of historical photographs depicting Glenn Curtiss at work.

**<http://nix.nasa.gov>**

A great NASA Web site for those of you who like access to cool pics and photos of shuttle missions and other historical space and aeronautical research.

**<http://seds.lpl.arizona.edu/ssa/docs/Space.Shuttle/index.shtml>**

Lots of good basic information about the space shuttle and its parts with super graphics.

**[http://www.ksc.nasa.gov/shuttle/technology/sts-newsref/sts\\_overview.html#sts\\_program](http://www.ksc.nasa.gov/shuttle/technology/sts-newsref/sts_overview.html#sts_program)**

Go to this NASA site and key in the space transportation system's mission number to get all the information you can about that particular mission.

**PLEASE NOTE:** WHEN "SPACES" OCCUR IN WEB SITE ADDRESS, USE AN UNDERSCORE. FOR EXAMPLE: \_  
THESE "UNDERScores" ARE DIFFICULT TO SEE IN THIS PUBLICATION BECAUSE THE WEB SITE ADDRESSES ARE UNDERLINED.

## Web Site Scavenger Hunt



1. Who is the first female commander of a shuttle mission (STS-93)?
2. Name the payload of this mission (STS-93)?
3. Take a “walk around the space shuttle” and find the names for these abbreviations.  
  
ET =  
  
SRB =  
  
RMS =  
  
OMS =
4. How many levels are there to the crew cabin? Name each one.
5. Look at a diagram of the space shuttle and draw the wing configuration of the orbiter.
6. Check out the “Basic Aeronautics of the Space Shuttle” to find that the space shuttle is also called an \_\_\_\_\_ and a \_\_\_\_\_. Write its two names below.

## ***Web Site Scavenger Hunt (continued)***

7. Look at the picture in the “Basic Aeronautics of the Space Shuttle” section to find out how fast the orbiter is moving upon touchdown. (Give both mph and km/h.)
8. Review the “Space Shuttle Vocabulary” and the diagram to locate the two landing gears. Name the two landing gears.
9. In “How the Shuttle Flies” name the activity that you will be doing. What part of the shuttle’s mission will this relate to? (Hint: Look at the photos.)
10. In “Phases of a Space Shuttle Mission” section it tells us that a typical shuttle mission is divided into how many phases?

# Web Site Scavenger Hunt - Key

1. Who is the first female commander of a shuttle mission (STS-93)?

*Eileen Collins*

2. Name the payload of this mission (STS-93)?

*Chandra*

3. Take a "walk around the space shuttle" and find the names for these abbreviations.

ET = *External Tanks*

SRB = *Solid Rocket Boosters*

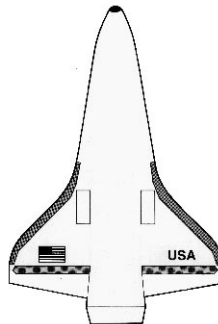
RMS = *Remote Manipulator System*

OMS = *Orbital Maneuvering System*

4. How many levels are there to the crew cabin? Name each one.

*3 flight deck, mid-deck, lower deck*

5. Look at a diagram of the space shuttle and draw the wing configuration of the orbiter.



6. Check out the "Basic Aeronautics of the Space Shuttle" to find that the space shuttle is also called an \_\_\_\_\_ and a \_\_\_\_\_. Name its two names below.

*Orbiter*

*Lifting Body*

## Web Site Scavenger Hunt - Key (continued)

7. Look at the picture in the "Basic Aeronautics of the Space Shuttle" section to find out how fast the orbiter is moving upon touchdown. (Give both mph and km/h.)

*226 mph*

*364 km/h*

8. Review the "Space Shuttle Vocabulary" and the diagram to locate the two landing gears. Name the two landing gears.

*Main landing gear*

*nose landing gear*

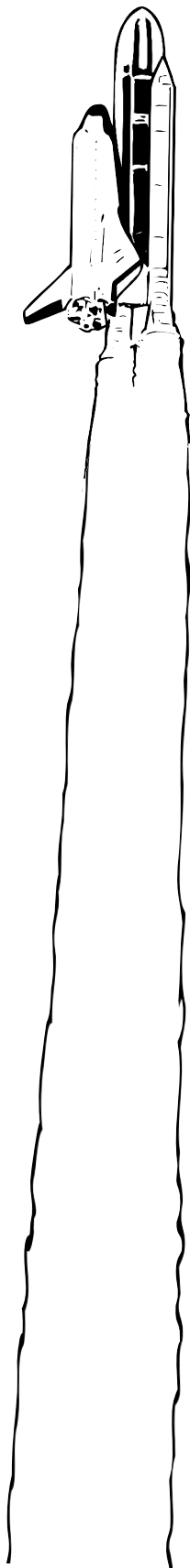
9. In "How the Shuttle Flies" name the activity that you will be doing. What part of the shuttle's mission will this relate to? (Hint: Look at the photos.)

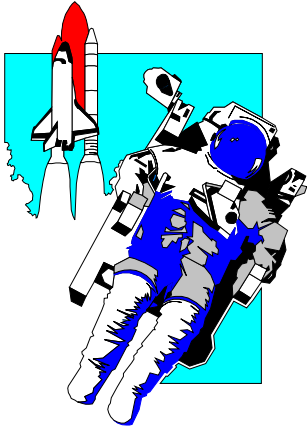
*Glide Slope*

*Landing*

10. In "Phases of a Space Shuttle Mission" section it tells us that a typical shuttle mission is divided into how many phases?

*6*





# ***Mini-Literature Unit***

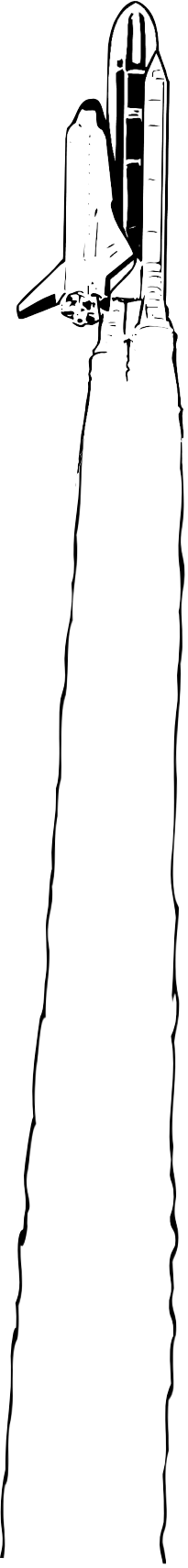
## ***Thrilling a Nation***

### Ruth Law Thrills a Nation

story and pictures by Don Brown  
Houghton Mifflin Company  
Boston, 1993

ISBN 0-395-66404-7 (hardcover)  
ISBN 0-395-73517-3 (paperback)

# Teacher Introduction



Using literature to integrate subjects through thematic instruction has become an effective methodology in the classroom. This sub-section contains a mini-literature unit using the picture book Ruth Law Thrills a Nation by Don Brown (Houghton Mifflin Company, Boston, 1993, ISBN 0-395-73517-3 or 0-395-66404-7). The book was selected because of the brief, yet well written, historically-based text and the engaging, colorful illustrations. A picture book was selected so that the teacher need only purchase one copy. The story traces the flight female aviator Ruth Law took as she attempted to be the first pilot to fly in one day from Chicago to New York. She did not make that goal, however she did become the first American pilot to fly non-stop for 590 miles.

This mini-literature unit follows the “Into, Through and Beyond” format. The “Into” section contains a comparison of women in the different decades, vocabulary exercises, introductory aviation activities and discussion topics. The “Through” section contains comprehension questions about the story (with answers!) and a discussion topic. The “Beyond” section includes an aircraft comparison chart, a collaborative creative writing activity, and an artistic project.



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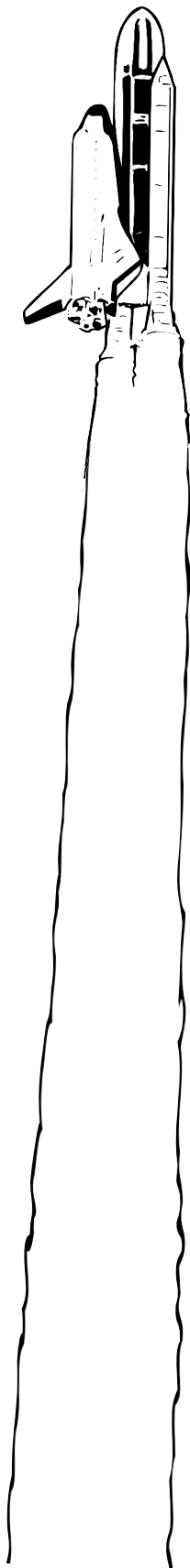
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## ***"Into" Activities***

- **Comparing Women of Different Decades**

Using the Woman's Work chronology chart from the Web site:  
<http://quest.arc.nasa.gov/space/frontiers/activities/womanswork/chart.html>  
and supplementing with pictures of women's dress from the 1910s and today, have the students complete the comparison chart and discuss their impressions.

- **Female Aviators**

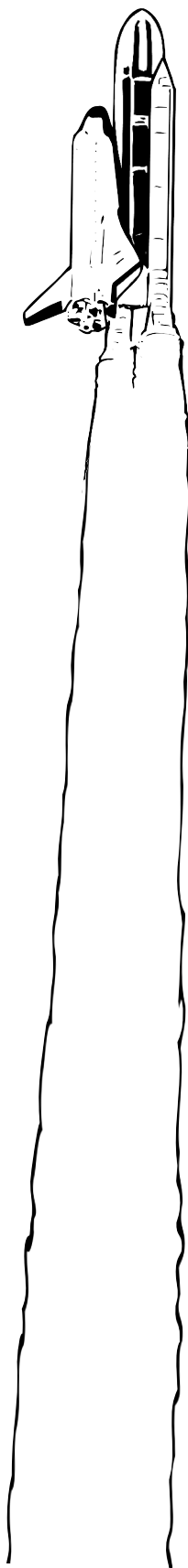
As a class have students list the names and feats of any female aviator they have heard about. Then display the timeline that chronologically displays who some of these female aviators were and what their contributions to aviation were.

- **Chicago to New York, Now Boarding!**

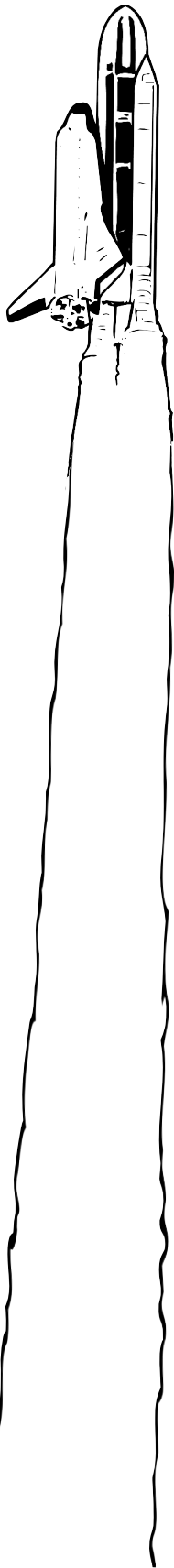
On a map of the United States, pinpoint Chicago, Illinois, and New York City, New York. Measure the distance (as the crow flies!) and post. Point out that by 1916 no one had flown that distance (that far) non-stop. Discuss the importance with your class.

- **That Daring Woman in Her Flying Machine**

Show students a drawing of the airplane that Ruth Law flew and discuss its structure.



## ***Comparing Women of Different Decades***



**Women of the 1910s**

**Women of Today**

**Name 3 ways they are similar.**

A large, empty rectangular box intended for students to write their answers to the prompt 'Name 3 ways they are similar.'

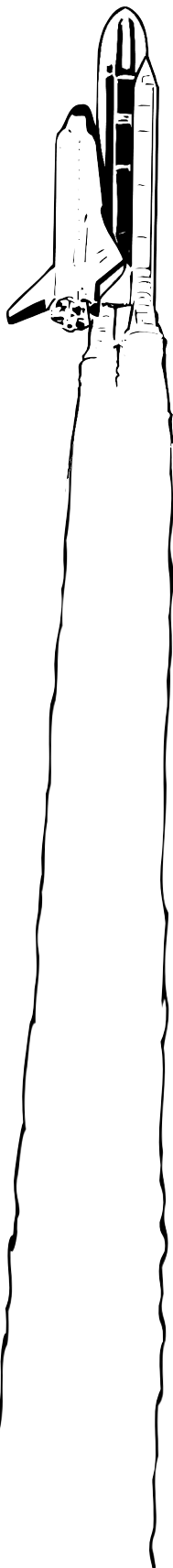
**Name 3 ways they are different.**

**In what way?**

An empty rectangular box intended for students to write their answers to the prompt 'Name 3 ways they are different.'An empty rectangular box intended for students to write their answers to the prompt 'Name 3 ways they are different.'

# ***Comparing Women of Different Decades***

## ***Key of Possible Answers***



**Women of the 1910s**

**Women of Today**

**Name 3 ways they are similar.**

*Wear dresses.*

*Still do most of the housework.*

*Raise families.*

*Still work as teachers, nurses, and domestics.*

**Name 3 ways they are different.**

**In what way?**

*Mostly 5th grade  
schooling.*

*Always in dresses and  
hats.*

*Mainly teachers, nurses,  
and domestics.*

**education**

**clothing**

**type of  
work**

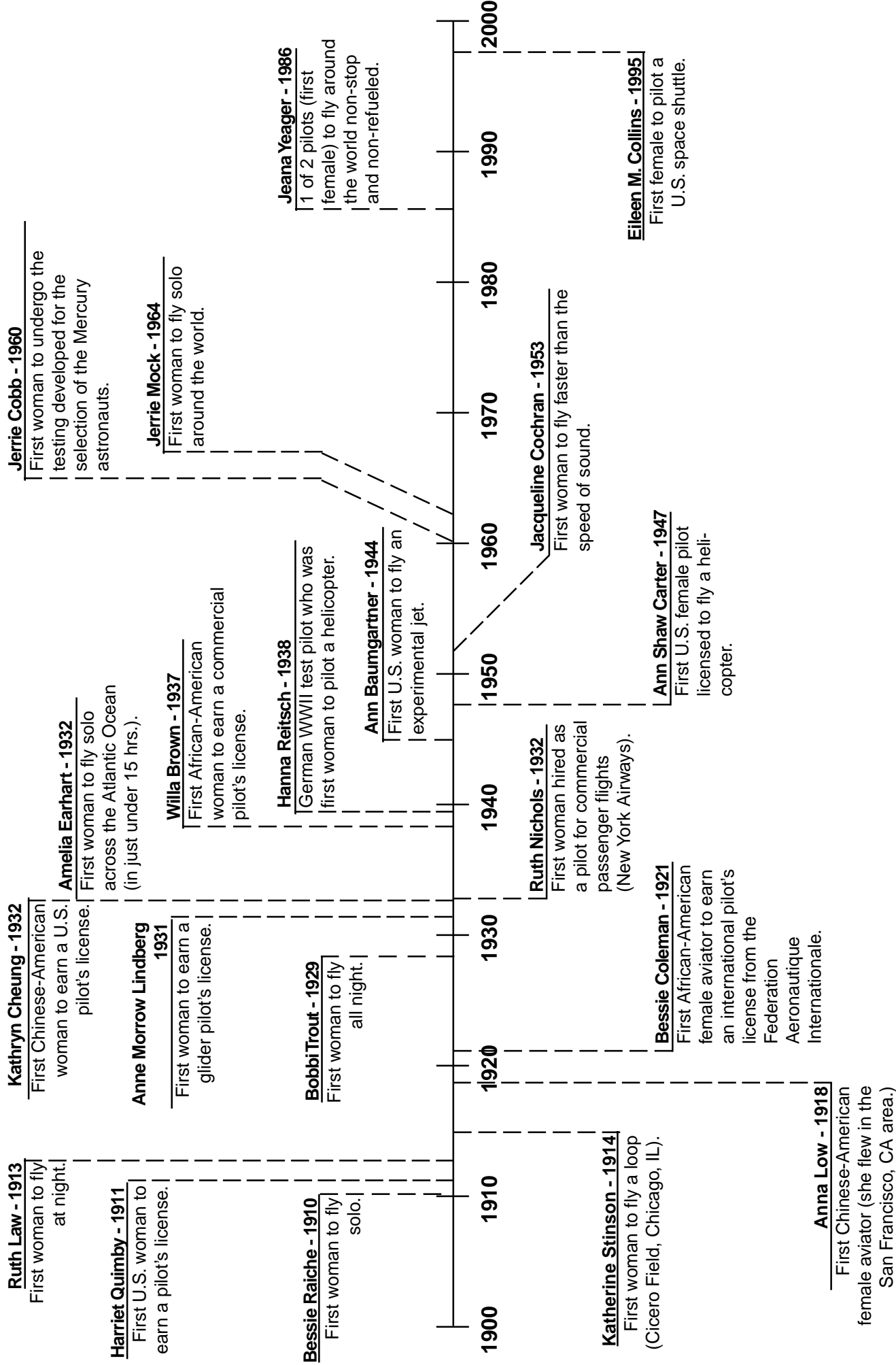
*Mostly high school and  
some college.*

*More casual.*

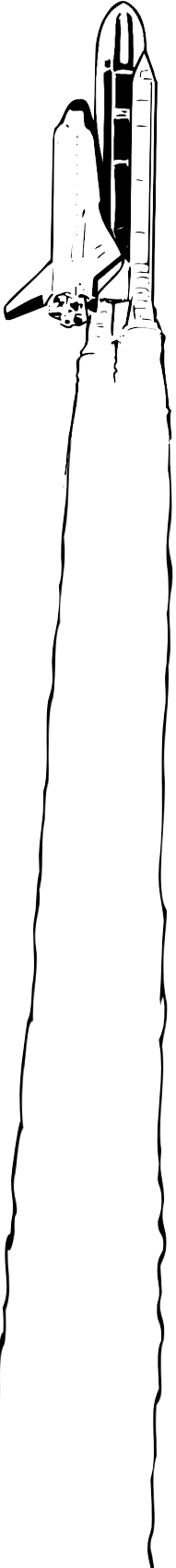
*More different types like  
lawyers, doctors,  
scientists, researchers.*



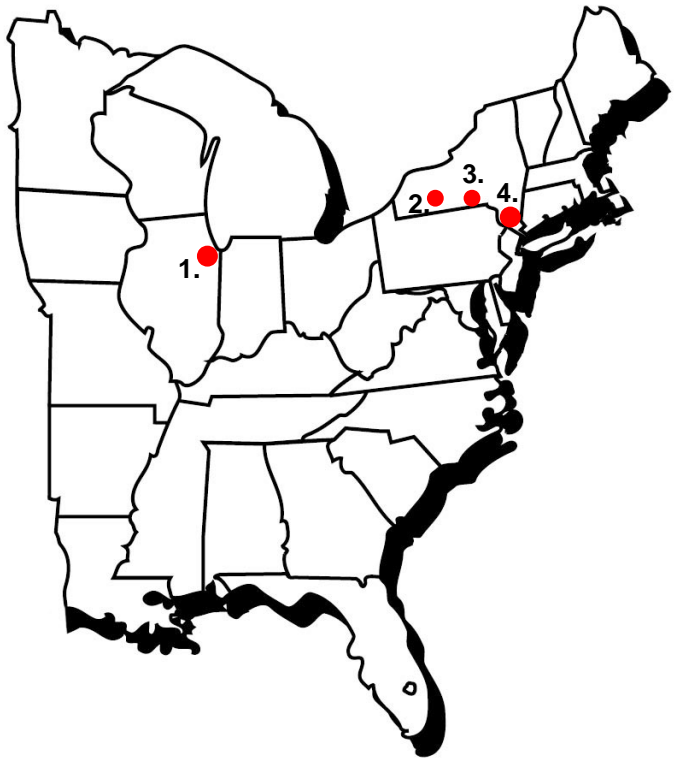
# Female Aviation Firsts



## *Chicago to New York, Now Boarding!*



1. Chicago, Illinois
2. Hornell, New York
3. Binghamton, New York
4. New York City, New York



**Discussion :** Point out the aforementioned cities on the map. Ruth Law begins her flight in Chicago and ends the final leg of her flight in New York City. The first leg of her flight Chicago, Illinois to Hornell, New York, is 590 miles. No pilot had ever flown that far in one flight. Discuss with your students why up until 1916 no pilot had flown that distance (590 miles).

Possible well thought out answers:

- They hadn't made airplanes that had fuel tanks big enough to hold the amount of fuel they needed to fly that far.
- They hadn't made airplanes with reliable enough engines to fly for such a long time without giving out.
- The airplanes they made back then were not as streamlined as they are now so they had too much drag. They did not fly as efficiently because of that extra amount of drag.
- Because airplanes were such a new technology, they were still learning how to make them fly better, faster, farther and more efficiently.

## ***That Daring Woman in Her Flying Machine***

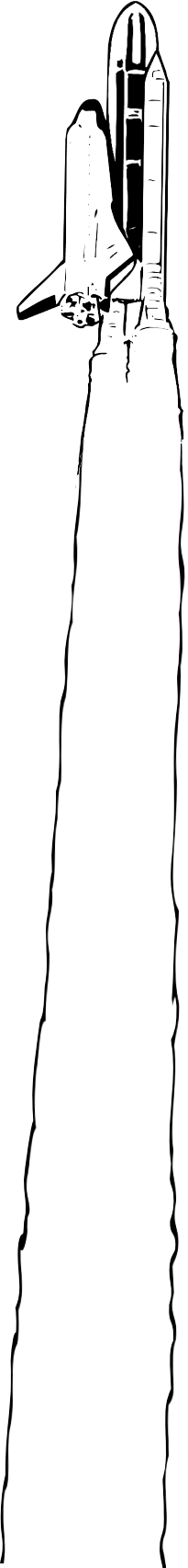


### ***Curtiss Pusher Biplane***

Length:	33.5 feet (10.3 meters)
Total Weight:	550 pounds (249.5 kg)
Wing Span:	29.75 feet (9.2 meters)
Aileron dimensions:	6 x 2 feet (1.82 x .6 meters)
Motor:	4-cylinder of 30 horsepower
Speed:	45 mph
Propeller:	One direct drive pusher propeller 6.5 feet (2 meter) in diameter placed behind the pilot and wings near mid-ship.
Control Surfaces:	2 Ailerons set between the wings on each side control the roll motion.

**Teacher's Note:** This is a later version of the model Ruth Law flew.

## ***"Through" Activities***



- **Vocabulary List**

A list of vocabulary important to the story is included along with definitions.

- **Vocabulary Crossword Puzzles**

A set of 3 crossword puzzles using 11 of the vocabulary words each is included.

- **Comprehension Questions**

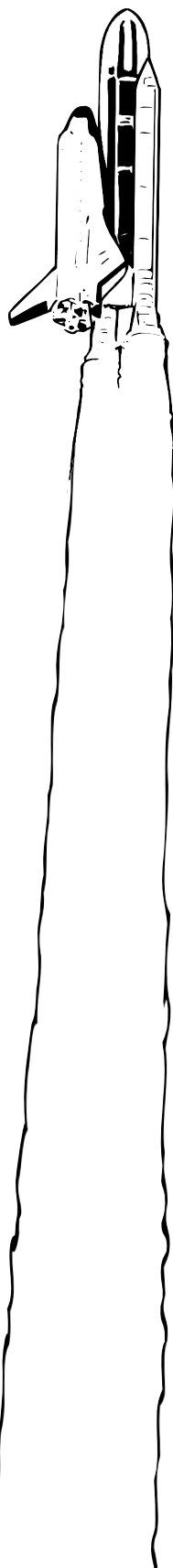
A series of 31 comprehension questions (and their answers) about the story is included.

- **Plotline**

Have the students cut the story descriptors into strips and then affix them in sequential order on the plotline.



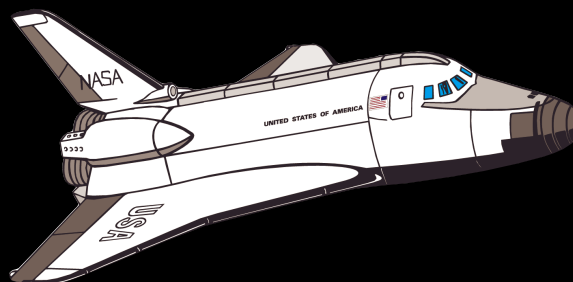
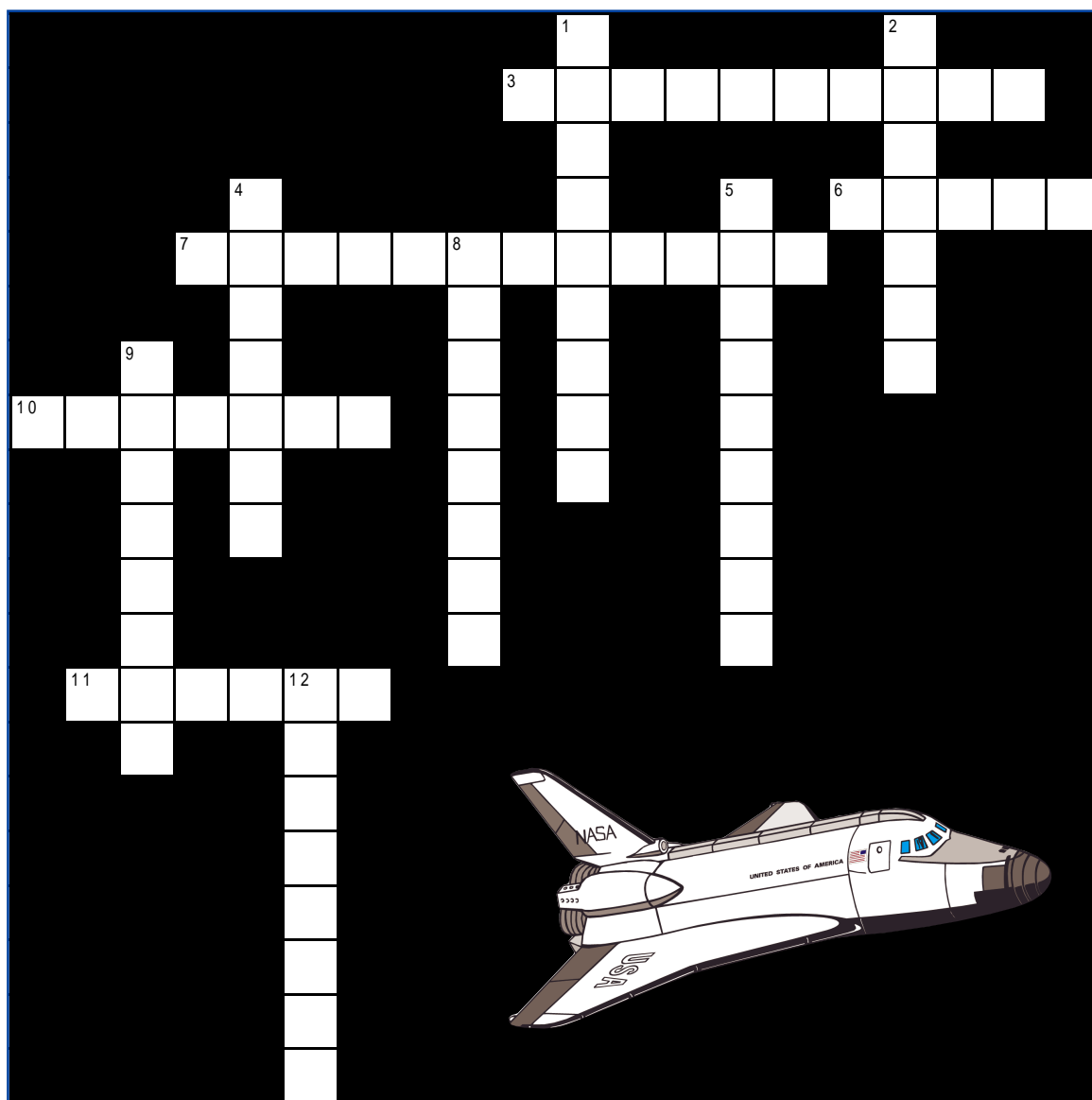
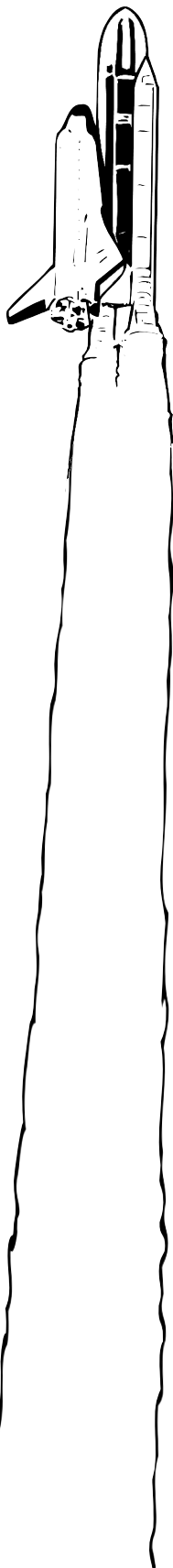
## ***Ruth Law's Vocabulary Words***



- |                   |  |
|-------------------|--|
| 1. frosty         | chilly or briskly cold                                   |
| 2. blustery       | stormy wind gusts  |
| 3. bulky          | having great weight or volume so that it bulges          |
| 4. manufacturer   | a person or company that makes a product                 |
| 5. refused        | to turn down a request, to not allow                     |
| 6. mechanics      | people who repair or fix machines                        |
| 7. attached       | to fasten  |
| 8. windshield     | a screen placed in front of occupants in a vehicle       |
| 9. gallons        | a unit of liquid measure                                 |
| 10. nightfall     | dusk, the end of daylight                                |
| 11. throttle      | a lever that controls the thrust of the engine           |
| 12. hollows       | a small valley or depression in the land                 |
| 13. awkwardly     | moving clumsily  |
| 14. onlookers     | spectator  |
| 15. narrowly      | barely missing an object                                 |
| 16. frigid        | extremely cold   |
| 17. consulting    | to refer to or make use of                               |
| 18. crude         | something put together in a simple fashion               |
| 19. scroll        | paper that is rolled                                     |
| 20. compass       | an instrument that gives cardinal directions             |
| 21. speedometer   | an instrument that measures speed                        |
| 22. propelled     | to move forward  |
| 23. approximately | not exact  |
| 24. supporters    | people who give help                                     |
| 25. pitched       | to move the nose of an airplane up                       |
| 26. slightly      | a little bit   |
| 27. steering gear | an instrument that controls the direction of a vehicle   |
| 28. record        | an unsurpassed statistic                                 |
| 29. striking      | something that is noticed because of its unusual quality |
| 30. cameo         | a brief appearance                                       |
| 31. slanted       | to slope   |
| 32. hospitality   | a pleasant or friendly welcome                           |
| 33. banquet       | a meal held in recognition of a special event            |
| 34. heroine       | female hero  |
| 35. honor         | a public showing of respect                              |
| 36. heralded      | to proclaim with enthusiasm in public                    |
| 37. feat          | an act of great skill, endurance or ingenuity            |

# Crossword Puzzle #1

**Directions:** Use the clues below to complete the crossword puzzle.



## ACROSS

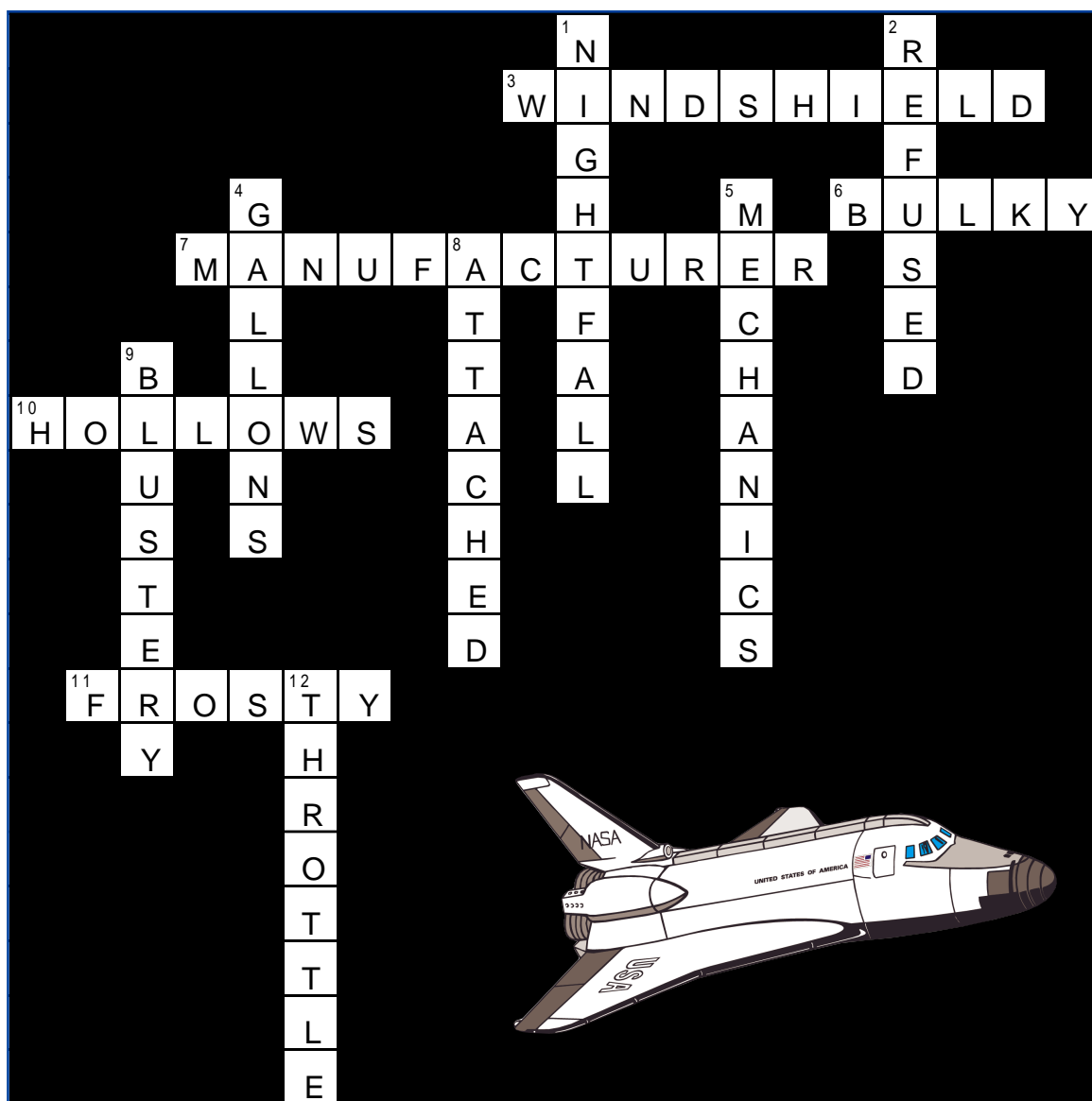
- 3 a screen on a vehicle that protects the occupants
- 6 having great weight or volume
- 7 a person or company that makes a product
- 10 a small valley
- 11 chilly or briskly cold

## DOWN

- 1 the end of daylight
- 2 to not allow
- 4 a liquid measurement
- 5 people who fix or repair machines
- 8 to connect or fasten
- 9 stormy wind gusts
- 12 used to control the engine's thrust

# Crossword Puzzle #1 - Key

**Directions:** Use the clues below to complete the crossword puzzle.



## ACROSS

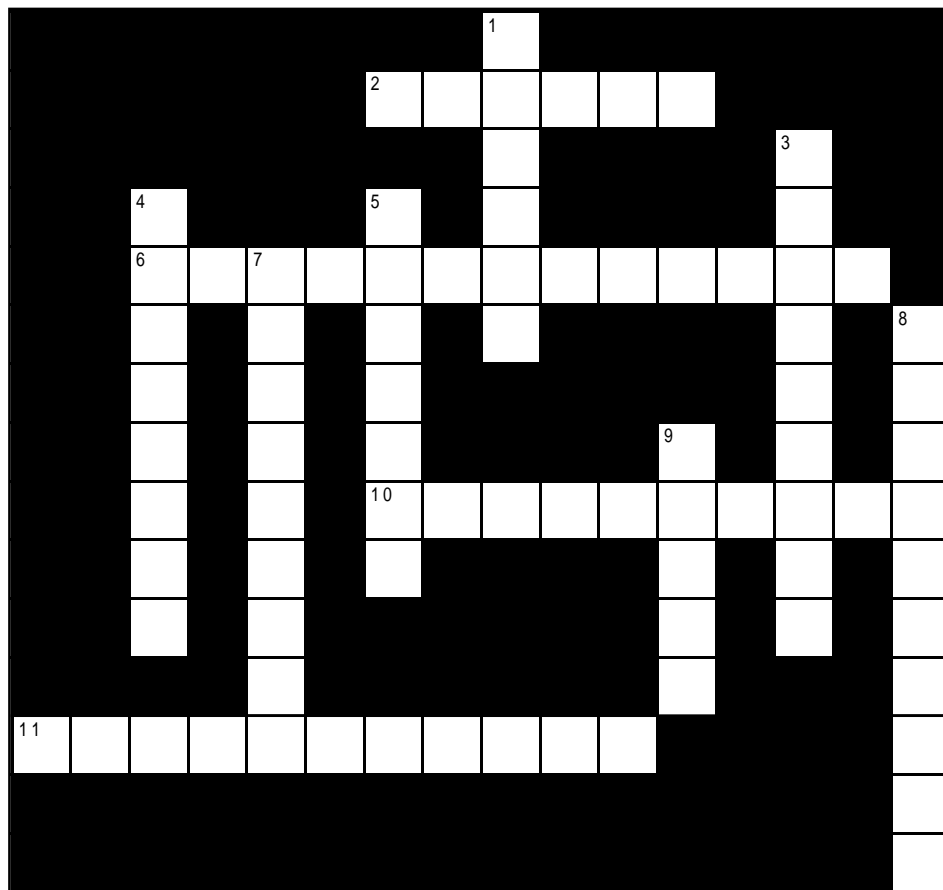
- 3 a screen on a vehicle that protects the occupants
- 6 having great weight or volume
- 7 a person or company that makes a product
- 10 a small valley
- 11 chilly or briskly cold

## DOWN

- 1 the end of daylight
- 2 to not allow
- 4 a liquid measurement
- 5 people who fix or repair machines
- 8 to connect or fasten
- 9 stormy wind gusts
- 12 used to control the engine's thrust

## Crossword Puzzle #2

Directions: Use the clues below to complete the crossword puzzle.



### ACROSS

- 2 rolled up paper
- 6 not exact
- 10 people who give help or aid
- 11 a device that measures speed

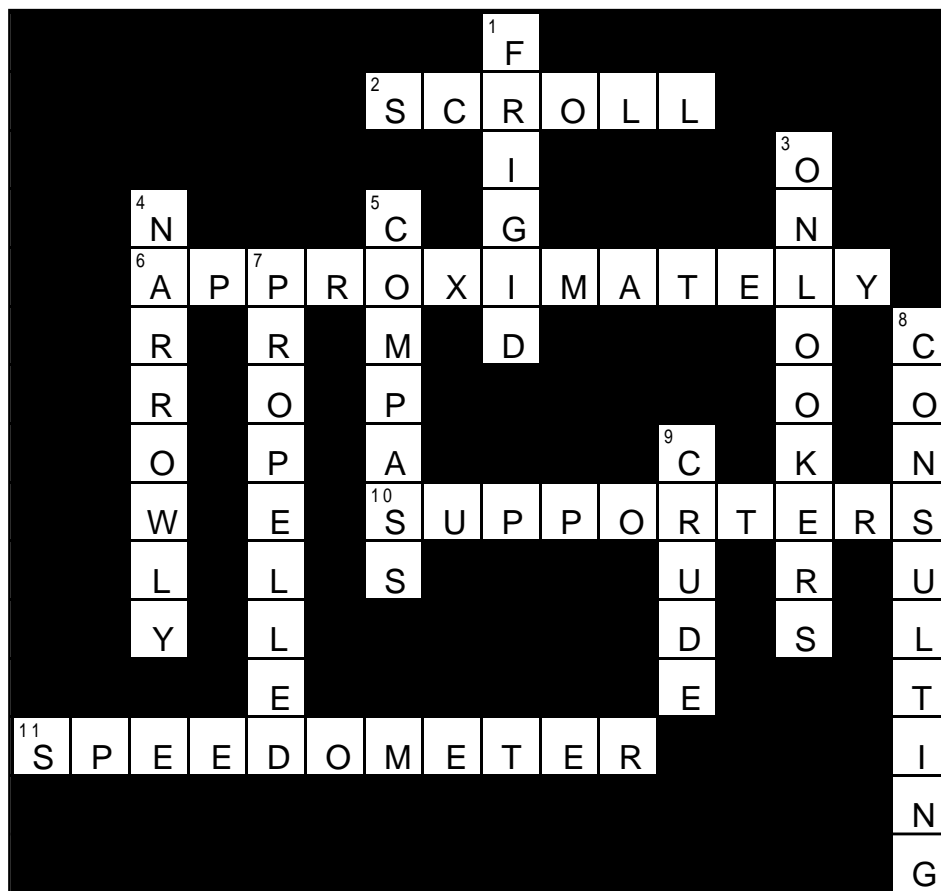
### DOWN

- 1 extremely cold
- 3 spectators

- 4 barely missing an object
- 5 a device that gives the cardinal directions
- 7 to put into motion
- 8 to make use of, to refer to
- 9 something put together simply

## Crossword Puzzle #2 - Key

Directions: Use the clues below to complete the crossword puzzle.



### ACROSS

- 2 rolled up paper
- 6 not exact
- 10 people who give help or aid
- 11 a device that measures speed

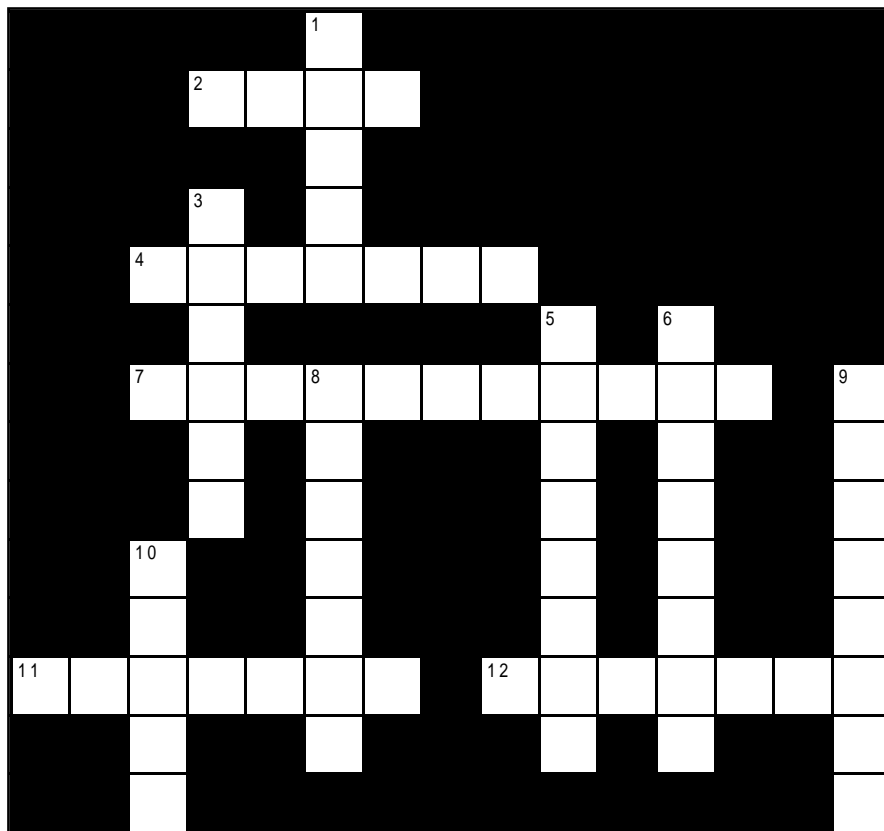
### DOWN

- 1 extremely cold
- 3 spectators

- 4 barely missing an object
- 5 a device that gives the cardinal directions
- 7 to put into motion
- 8 to make use of, to refer to
- 9 something put together simply

## Crossword Puzzle #3

Directions: Use the clues below to complete the crossword puzzle.



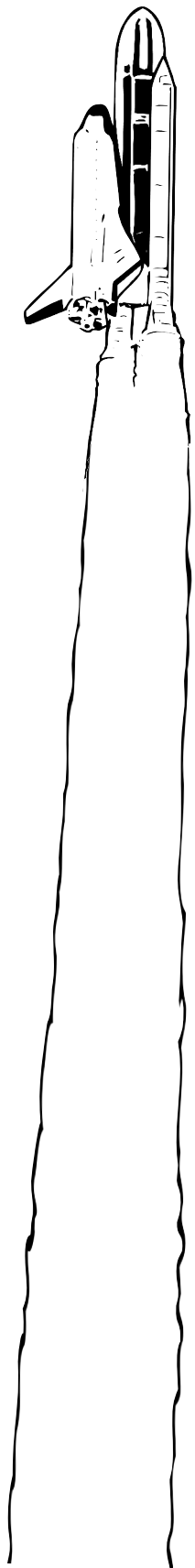
### ACROSS

- 2 an act of great skill or endurance
- 4 female hero
- 7 a friendly welcome
- 11 a meal held in recognition of a special event
- 12 to slope

### DOWN

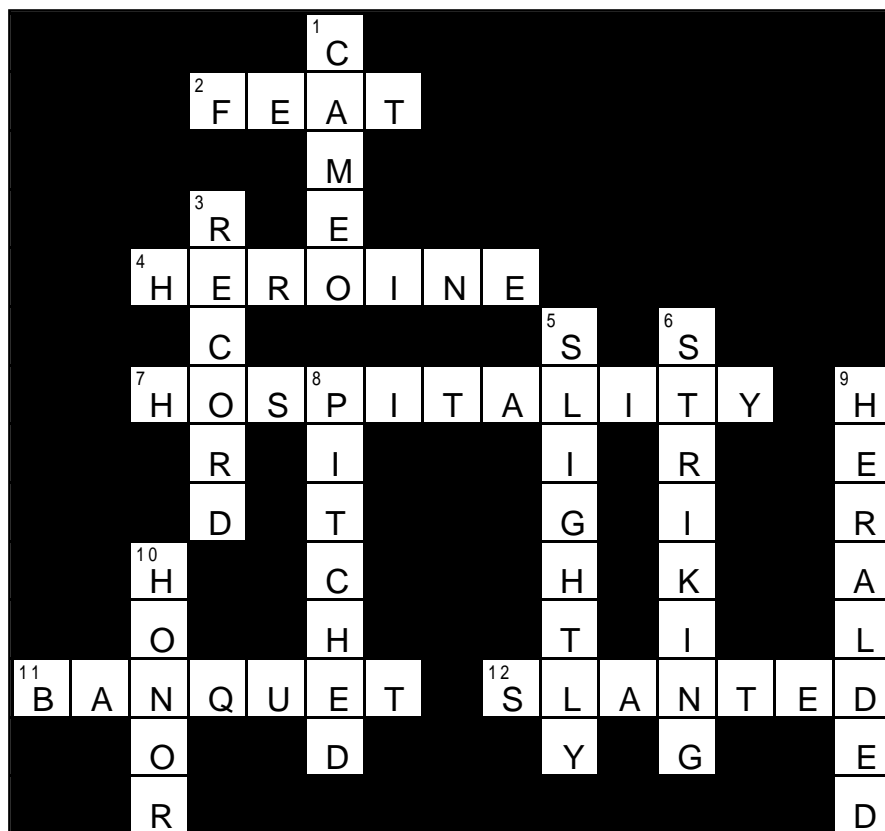
- 1 a brief appearance
- 3 an unsurpassed statistic

- 5 a little bit
- 6 something that is noticed because of its unusual
- 8 to move the nose of an airplane up
- 9 to say in public with great enthusiasm
- 10 a public showing of great respect



## Crossword Puzzle #3 - Key

**Directions:** Use the clues below to complete the crossword puzzle.



### ACROSS

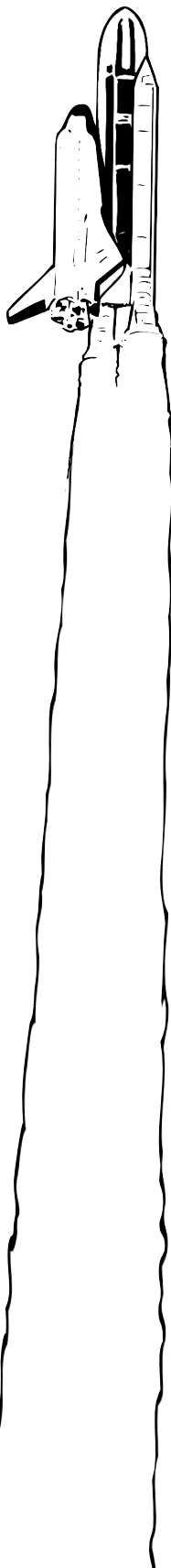
- 2 an act of great skill or endurance
- 4 female hero
- 7 a friendly welcome
- 11 a meal held in recognition of a special event
- 12 to slope

### DOWN

- 1 a brief appearance
- 3 an unsurpassed statistic

- 5 a little bit
- 6 something that is noticed because of its unusual
- 8 to move the nose of an airplane up
- 9 to say in public with great enthusiasm
- 10 a public showing of great respect

## Comprehension Questions



1. What was Ruth Law going to try to accomplish on November 19, 1916?

*Fly from Chicago, Illinois to New York City, New York, in one day.*

2. Why did Ruth Law sleep in a tent on the roof of a Chicago hotel?

*She needed to get used to the cold because on her flight she would be exposed to very cold air (cooler autumnal weather and cold air from a higher altitude). The airplane she would fly had an open cockpit.*

3. Describe how Ruth dressed for warmth.

*2 woolen long johns, 2 leather suits, a skirt over her pants*

4. Why do you think Ruth Law wore a skirt?

*In 1916 proper ladies had to wear dresses or skirts. They were really “looked down upon” for wearing pants.*

5. From where exactly did Ruth Law take off?

*Grant Park on the shore of Lake Michigan.*

6. What did Ruth Law call her airplane? Explain why.

*“Baby Machine” because it was an older and smaller airplane that was good for flying stunts in an air show, but not very good for long distance flights.*

7. Why didn’t Ruth Law get a bigger, newer and better airplane?

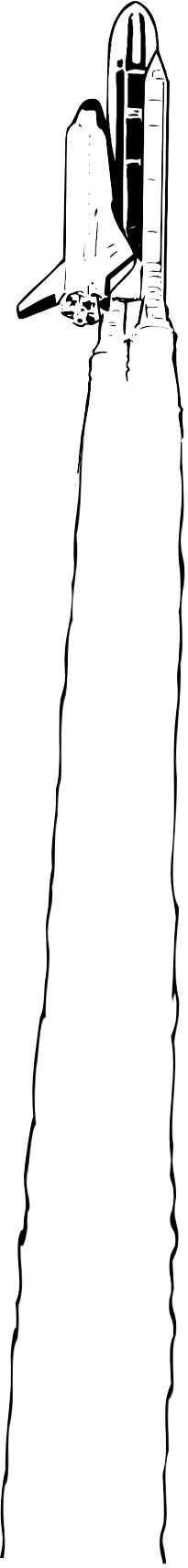
*Ruth Law tried, but a leading airplane manufacturer of the time would not sell her an airplane.*

8. Why did Mr. Curtiss refuse to sell Ruth Law a larger airplane?

*Mr. Curtiss believed that a woman could not pilot a large airplane. He also thought that flying was dangerous, perhaps too dangerous for women.*



## Comprehension Questions (continued)



9. What changes did Ruth Law have made to her little airplane to make it fly better for the trip?

*She had the mechanics attach a windshield to protect the pilot from the constant rush of cold air. The mechanics also added another fuel tank so she wouldn't have to stop and refuel more than one time.*

10. How much fuel did both fuel tanks hold?

*53 gallons*

11. What did adding another fuel tank to the airplane do to the airplane itself?

*It made the airplane heavier.*

12. How would this affect the airplane's ability to fly?

*If you increase the weight of the airplane then it might make the plane too heavy for the engines to move fast enough across the runway to gain lift. A heavier airplane would then need a greater wingspan (or aspect ratio) and more engine power.*

13. How did the mechanics solve the heavier weight problem?

*They took the lights off the airplane to make the airplane lighter.*

14. Without lights on the airplane, did this change Ruth Law's flight plans?

*Without lights, she would not be able to navigate very well after sunset. She would have to get to New York City before it got dark.*

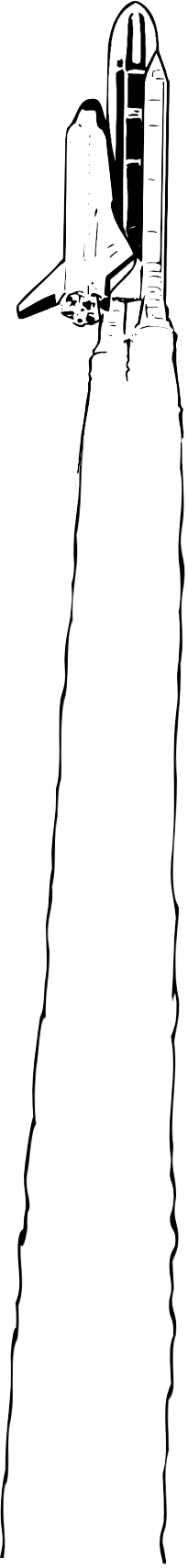
15. What gave her a late start on her flight?

*The freezing weather made it hard to get the engine started.*

16. Why do you think she took her skirt off?

*So it wouldn't get in the way, flap in the wind, or maybe get caught on something and cause her to injure herself.*

## Comprehension Questions (continued)



17. Why do you think the crowd watched with fear as her airplane took off?

*It was very windy and the airplane appeared to be hard to control during take off. They probably worried that she might lose control of the airplane.*

18. How fast and how high was Ruth Law flying her airplane?

*Ruth Law was flying 100 miles per hour, one mile above the earth.*

19. How did she stay on course?

*She used maps she taped to her leg, a compass, a clock and a speedometer to track her flight path.*

20. What two things did Ruth Law depend upon to help move her airplane along?

*She depended upon gasoline for engine fuel and the wind, but the wind was not as strong as she had hoped it would be.*

21. Where did Ruth Law have to land at 2:00 P.M. and why?

*She had to land in Hornell, New York, because her airplane was out of fuel.*

22. In those six hours of flight, how far had she flown non-stop?

*She had flown 590 miles non-stop. It was a new record.*

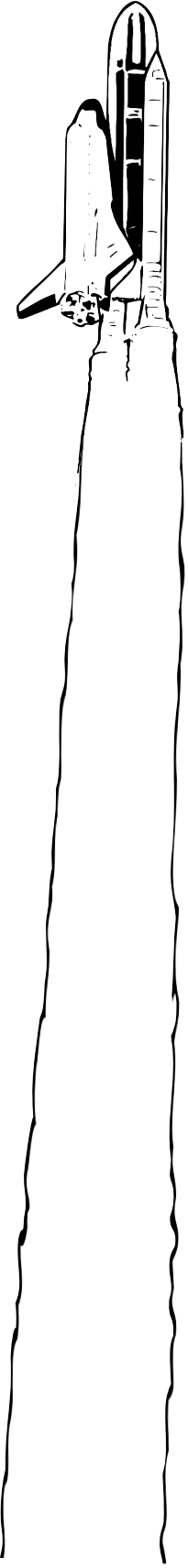
23. Did she quit after she landed short of New York City?

*No. She ate lunch, refueled the airplane and continued on to New York City.*

24. How did people know about her flight while it was happening that same day?

*The newspapers followed her flight and wrote about it. (Point out to students that some newspapers during those days published more than one, sometimes three, editions each day. The telegraph was also used to relay information.)*

## Comprehension Questions (continued)



25. What did the crowd of onlookers think when they saw Ruth Law's airplane head down towards the ground and disappear behind a grove of trees?

*The crowd thought that she had crashed perhaps because something was not working properly on her airplane.*

26. Ruth Law was only 2 hours away from New York City, why did she stop flying?

*She decided to land because it was getting dark and she would not be able to read her map or her instruments. It would have been too dangerous to fly in the dark.*

27. Did she fly all the way to New York City? What happened when she got there?

*Yes, she made it. An army general and a musical band greeted her. Newspapers said she was a heroine who had accomplished an incredible feat. The President of the United States, Woodrow Wilson, said she was great, and a special dinner was held to honor her and her accomplishment.*

28. Did Ruth Law accomplish her goal of flying from Chicago to New York City in one day?

*No, she did not because she had to stop in Hornell, two hours short of New York City.*

29. Do you consider her a failure because she did not accomplish that goal? Explain your answer.

*See if the idea can be imparted that even though she did not accomplish that specific goal, she did accomplish a goal of perhaps equal importance.*

30. Who broke Ruth Law's record a year later?

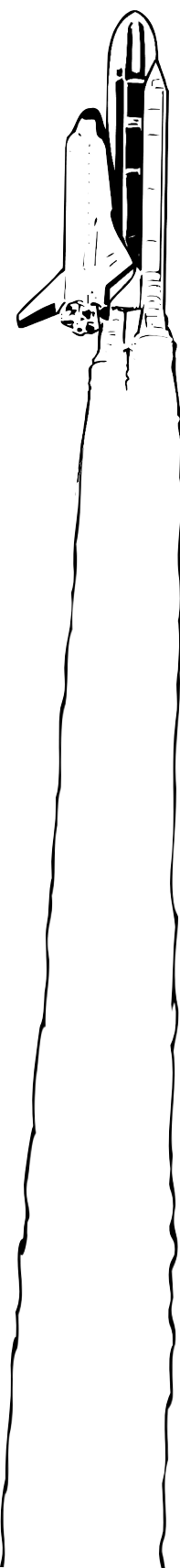
*Katherine Stinson in 1917.*

31. List some factors that if each were changed, the outcome might have been different. Give the different outcome also.

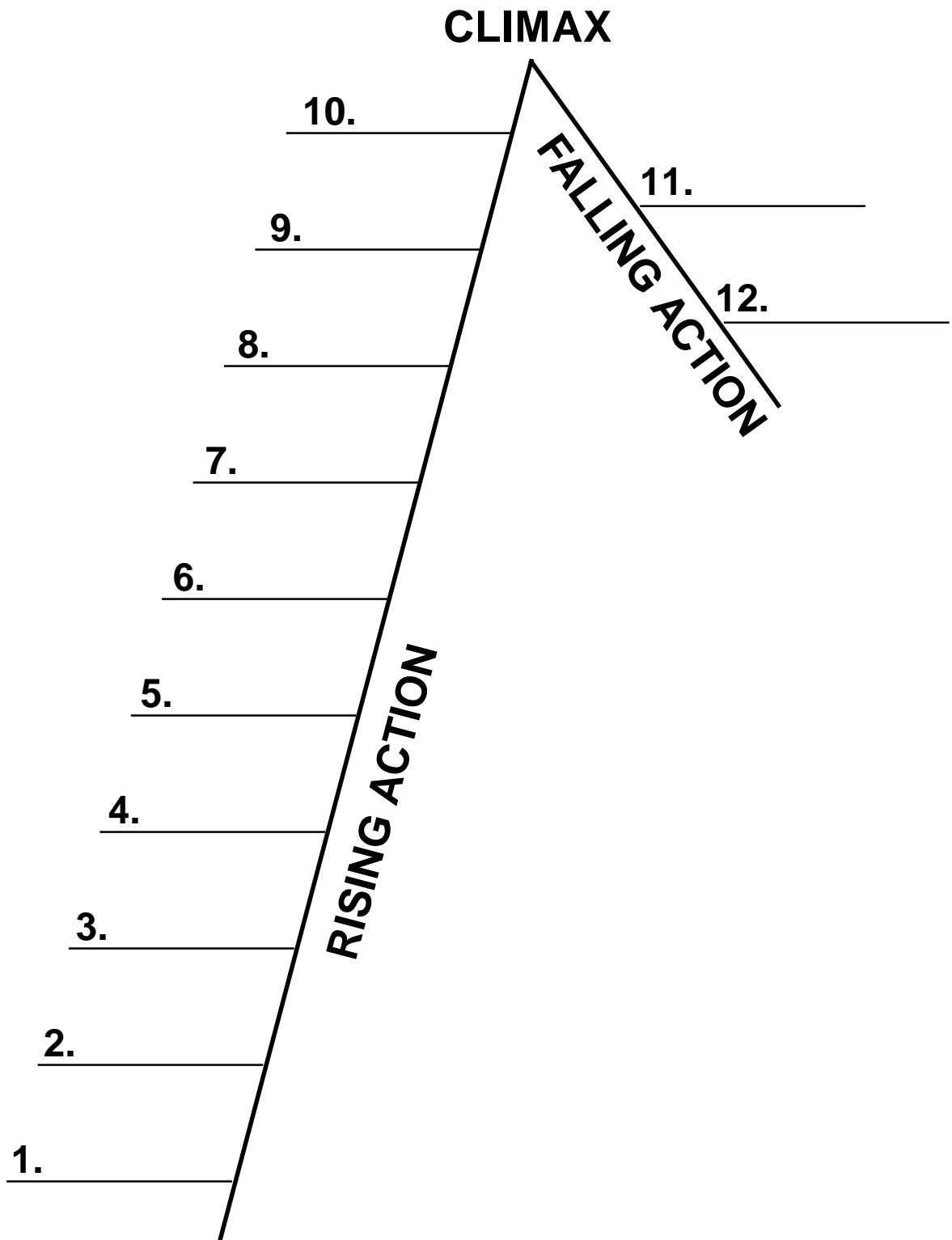
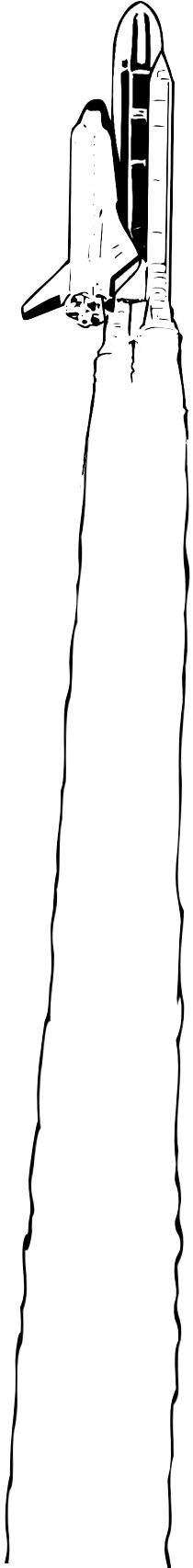
- *Bigger fuel tank: She would not have run out of fuel short of New York City.*
- *Not having engine trouble and leaving earlier: She would have had more daylight hours in which to fly.*
- *Fly during the spring or summer: More daylight hours in which to fly and warmer weather would have made the engine easier to start.*

## ***Ruth Law's Plotline***

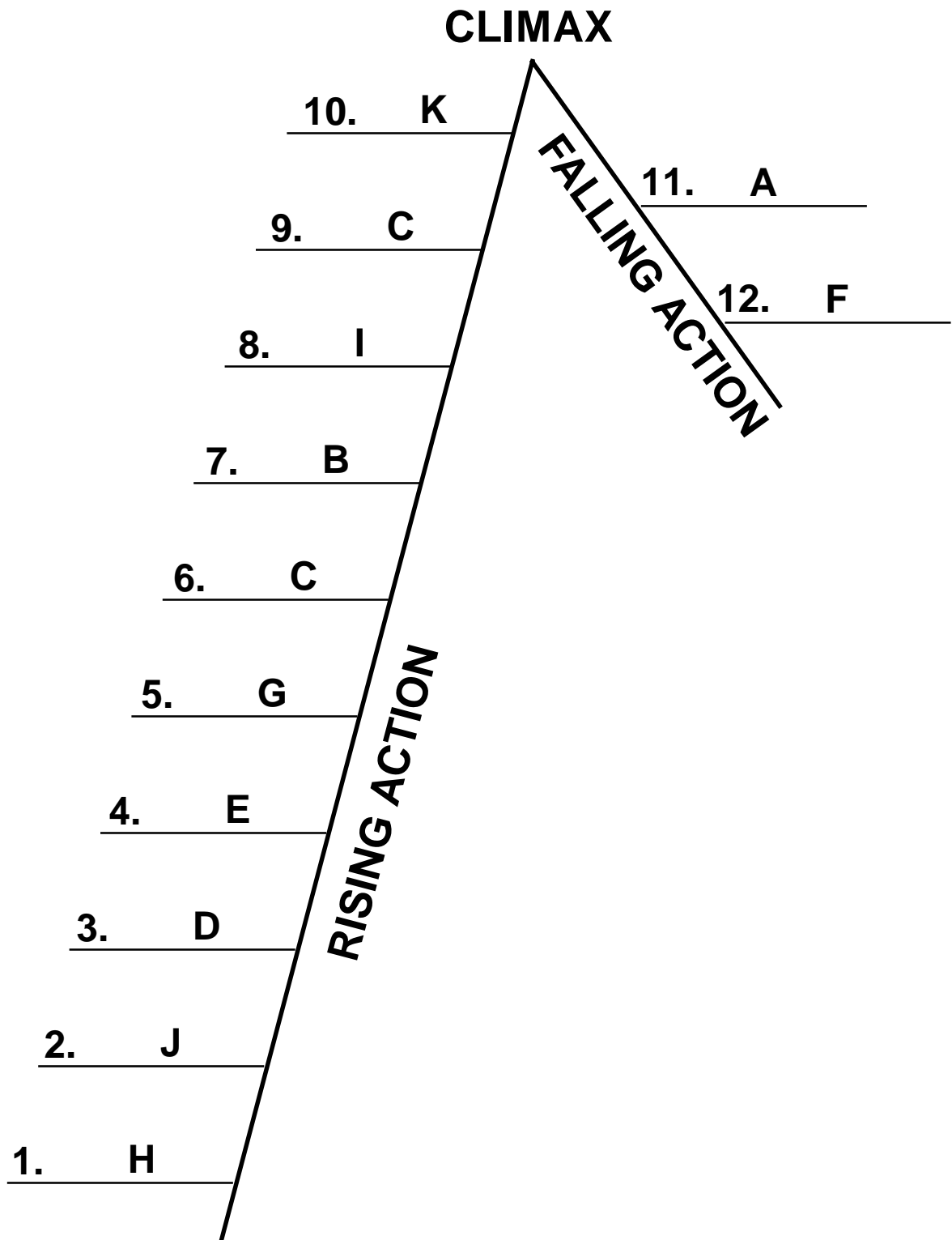
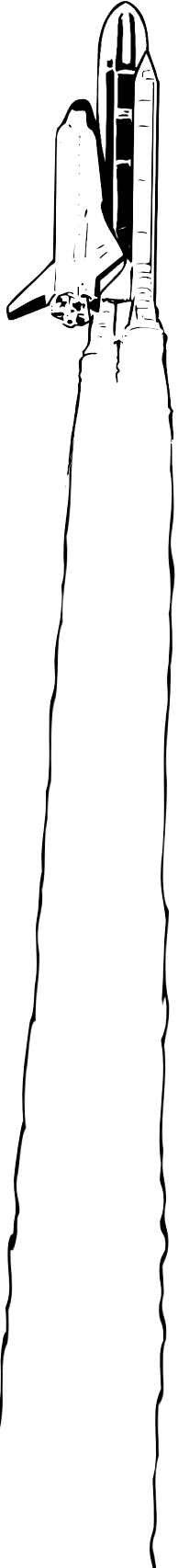
**Directions:** After reading the story Ruth Law Thrills a Nation, carefully read over each event from the story below. Cut out each event as a strip and place the events in their proper order of occurrence (according to the story). Tape or glue them to the plotline.

- 
- A) Ruth Law leaves the next morning and makes it to New York City.
  - B) Ruth eats lunch and refuels her airplane.
  - C) She flies over a crowd of onlookers at Binghampton, New York.
  - D) Very cold weather made it hard to get the airplane's engine to start.
  - E) Ruth Law flies her "baby machine" one mile above the earth at 100 miles per hour.
  - F) After landing in New York City, she is greeted as a heroine because she set a new flying record for the longest non-stop flight of 590 miles.
  - G) Ruth flies for 6 hours and runs out of gas.
  - H) Ruth Law awakens before dawn on the rooftop of a Chicago hotel.
  - I) Ruth took off for New York City at 3:24 P.M. after flying nonstop for 590 miles.
  - J) Ruth puts on 2 pairs of longjohns, 2 leather suits and 1 skirt.
  - K) Ruth Law lands her airplane two hours away from New York City because it is getting dark.
  - L) Ruth Law lands her airplane in Hornell, New York.

# Plotline



# Plotline - Key



## ***Beyond Activities***

- **Comparing Aircraft**

Compare the type of airplane Ruth Law flew in 1916 to the Space Shuttle (orbiter) Commander Eileen Collins flies in 1999.

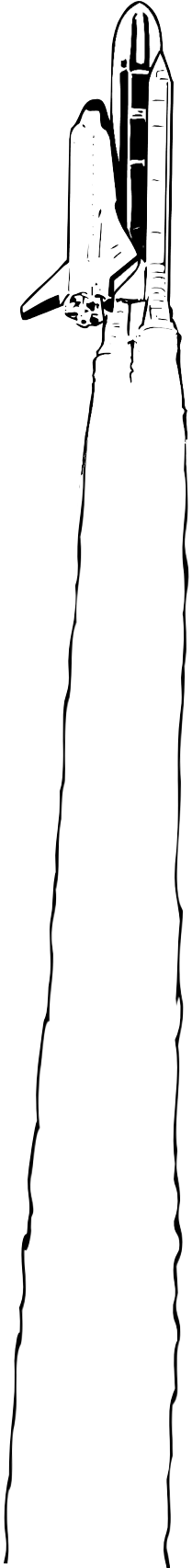
- **Historical Aviation Commemoration**

Students (in groups or individually) can commemorate Ruth Law's feat of aviation by creating and displaying one of the following:

- Postage stamp
- Poster
- Banner
- Poem
- Statue
- Flight Patch
- Song
- Dance

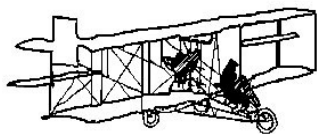
- **Commander Collins Thrills a Nation**

The class participates in re-writing the Ruth Law story so that it gives an account of the space shuttle mission STS-93 with Commander Eileen Collins as the main character.

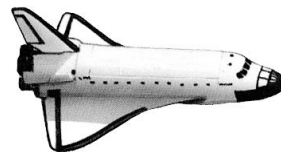


## ***Comparing the Aircraft***

**Ruth Law's Airplane**



**Commander Collin's Orbiter**



**Name 3 ways these 2 aircraft  
are similar.**

A large, empty rectangular box with a black border, intended for students to write three ways the two aircraft are similar.

**Name 3 ways these 2 aircraft  
are different.**

**In what way?**

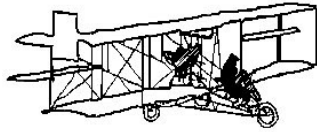
A rectangular box with a black border, intended for students to write the first difference between the two aircraft.A rectangular box with a black border, intended for students to write the second difference between the two aircraft.



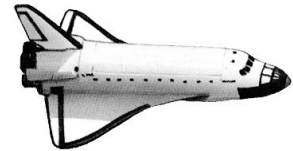
# Comparing the Aircraft

## Key of Possible Answers

Ruth Law's Airplane



Commander Collin's Orbiter



**Name 3 ways these 2 aircraft are similar.**

*Both use the 4 forces to fly.  
(Lift, Weight, Thrust, Drag).*

*Both have wings.*

*Both have a tail section.*

*Both can fly at subsonic speed.*

*Both are piloted by a woman.*

**Name 3 ways these 2 aircraft are different.**

**In what way?**

*low subsonic only*

*one small engine*

*53 gallon capacity*

*open*

*in low altitude*

**flight speed**

**engines**

**fuel tanks**

**cockpit**

**flight elevation**

*hypersonic speed to  
subsonic*

*2 engine systems, plus  
main engine*

*much more than that*

*closed*

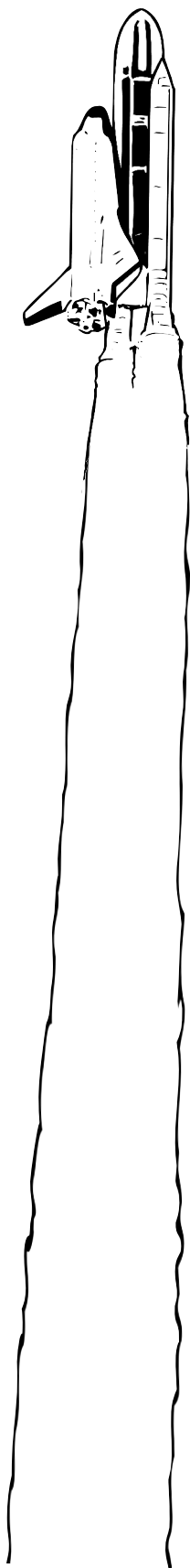
*space on down*

# Historical Aviation Commemoration Student Guidesheet

**Directions:** You are all members of the Historical Aviation Society and on November 19<sup>th</sup> of this year you will sponsor a “Ruth Law Day” to commemorate the anniversary of her historic flight. You will need some items to display that will reflect upon the accomplishment as well as honor it. In groups or individually, pick an item from the list below (or make up one of your own). Then, make a plan for how you will create it. Include in your plan a list of materials, and the steps you will take to make it happen. Finally, get to work on it!

## Commemoration Displays

- Create a commemorative postage stamp that includes the following: her image, her airplane and the date.
- Create a poster announcing her feat. Include the following information: her image, her airplane, the accomplishment and the date.
- Create a commemoration banner that includes the following information: a stylistic logo that conveys her image and her airplane, the date.
- Create a poem (any style of your choosing) and draw a picture to go with it.
- Compose a song (a ballad) that tells the story of Ruth Law’s flight.
- Create a sculpture (make it from household items or recyclable materials like paper towel rolls, wire, cans, plastic cups, plastic containers, etc.) that represents Ruth Law’s accomplishment. Give it an appropriate title.
- Look at examples of flight patches used for previous shuttle missions as well as mission STS-93. Create a flight patch that depicts Ruth Law’s accomplishment.
- Find a likeness of Ruth Law and create a statue.
- Choose an instrumental piece of music and create a dance that honors Ruth Law’s flight.



# Commander Collins Thrills a Nation Guidesheet

## Teacher Directions

Divide the class into partners or trios so that you have 13 small groups. Assign each small group two face-to-face pages of the story. Tell the class that they will be re-writing the story about Ruth Law, turning it into a story about Commander Eileen Collins' historic flight. Instruct them to re-write the text using the same style and then illustrate the text (by drawing, painting or using a computer software program for illustrations).

Show them the example below as a guide.

**On (the mission's date goes here), Eileen Collins commanded the shuttle mission STS-93 into space and back to earth.**

**Space shuttle missions had never been commanded before by a woman.**

**It was a crisp, clear morning. Commander Collins and her crew were awakened before dawn, but Eileen was not sleepy. To get used to the early mornings and the long days of hard work, she had trained for many years at NASA.**

